

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, or claims in the application.

Listing of Claims:

1. (Currently Amended): A method for OP-Cu-mediated protein-DNA crosslinking, labeling nucleic acids, the method comprising:

- a) contacting DNA ~~nucleic acid~~ molecules with hydrogen peroxide and a redoxactive coordination complex for a time and at concentrations sufficient to produce DNA ~~nucleic acid~~ single strand scission and free-aldehyde moieties on either the 5' or 3' end of the molecules at the site of scission;
- b) reacting the aldehyde moieties with amine to produce a condensation product; and
- c) labeling the condensation product such that 90 percent of the crosslinking occurs at the 5'-end or the 3'-end of the DNA molecules.

2. (original): The method as recited in claim 1 wherein the step of labeling the condensation product further comprises:

- c) reducing the condensation product; and
- d) contacting the reduced condensation product with a chromophore.

3. (Previously Presented): The method as recited in claim 1 wherein the coordination complex is 1,10-phenanthroline-Cu(II), or bleomycin-Fe(III), or EDTA-Fe, or ascorbic acid-Cu, or methylene-blue-Cu, metalloporphrin, or combinations thereof.

4. (original): The method as recited in claim 1 wherein the amine is a primary amine.

5. (original): The method as recited in claim 1 wherein the amine is ethylene diamine or hydrazine or aminated biotin.

6. (original): The method as recited in claim 1 wherein the contacting step occurs in an anaerobic environment.

7. (original): The method as recited in claim 1 wherein the step of labeling the condensation product further comprises reducing the condensation product and cross-linking the reduced condensation product with a label in one reaction step.

8. (original): The method as recited in claim 1 wherein the step of contacting the nucleic acid molecules with redox-active coordination complex includes contacting the nucleic acid with a denaturing agent.

9. (Currently Amended): A method for OP-Cu-mediated protein-DNA crosslinking, modifying nucleic acids, the method comprising:

- a) contacting free radicals with ~~the nucleic acids~~ DNA molecules to produce single stranded scission, ~~free~~ scission-free nucleic acid bases and aldehyde forms of ribose and deoxyribose at either the 5' ends or 3' ends at the site of scission;
- b) contacting the aldehyde forms with an amine to produce a condensation product;
- c) reducing the condensation product; and
- d) labeling the reduced condensation product such that 90 percent of the crosslinking occurs at the 5'- end or the 3'-end of the DNA molecules.

10. (Previously Presented): The method recited in claim 9 wherein the free radicals are produced by reacting hydrogen peroxide with chemical nucleases.

11. (Previously Amended): The method as recited in claim 10 wherein the chemical

nucleases are coordination complexes selected from the group consisting of 1,10-phenanthroline-Cu(II), bleomycin-Fe(III), EDTA-Fe, ascorbic acid-Cu, methylene-blue-Cu, metalloporphyrin, or combinations thereof.

12. (Previously Presented): The method recited in claim 9 wherein steps c and d occur simultaneously.

13. (Previously Presented): The method recited in claim 9 wherein step d occurs in anaerobic conditions.

14. (Currently Amended): The method as recited in claim 9 wherein the nucleic acid DNA is double stranded and wherein the step of contacting the free radicals with the nucleic acids is preceded by the addition of a double-strand weakening agent.

15. (original): The method as recited in claim 14 wherein the double-strand weakening agent is a denaturing agent selected from the group consisting of carbonic acid, urea, ethyl carbonate, cyanamide, urethane, and combinations thereof.

16. (Currently Amended): The method as recited in claim 9 wherein the nucleic acid DNA is modified at temperatures below the boiling point of water.

17. (Currently Amended): The method as recited in claim 9 wherein the nucleic acid modification crosslinking occurs at between 0 °C and 95 °C.

18. (Currently Amended): The method as recited in claim 9 wherein the free radicals are contacted with the nucleic acids DNA in an anaerobic atmosphere.

19. (New): The method as recited in claim 1 wherein the coordination complex is 1,10-phenanthroline-Cu(II).

20. (New): The method as recited in claim 9 wherein the free radicals are produced

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by reacting hydrogen peroxide with 1,10-phenanthroline Cu(II).